



Environmentally Preferable Purchasing Guide

Greening Your Purchase of Carpet

Carpet is quiet, soft, slip-resistant and often quite beautiful. These qualities make it an extremely common choice as a floor covering for office space. But carpet also presents a problem for solid waste management programs around the country and contributes to concerns about poor indoor environmental quality. By considering a variety of lifecycle attributes, from the materials used to manufacture and install carpet to recycling and disposal issues, purchasers can make informed decisions about carpet options.

Why Green Your Carpet?

Environmental and Health Concerns

Environmental and health concerns associated with carpet include indoor air quality, toxic chemical emissions from manufacturing and disposal operations, and solid waste impacts. A variety of volatile organic compounds (VOCs) can be emitted from carpet materials. For example, 4-phenylcyclohexene has a very low odor threshold and has been associated with indoor air quality complaints following the installation of new carpet. Other compounds emitted from carpet, such as formaldehyde and styrene, can present acute or chronic health concerns under certain exposure conditions.

The disposal, by incineration, of carpets and carpet materials is a source of environmental contamination. Dioxins and Furans are formed as by-products during waste combustion, especially poorly or uncontrolled combustion, where the chlorine content of the waste may play a more significant role in their production. Chlorine-containing materials that may be present in waste include, but are not limited to, polyvinyl chloride plastic (PVC or vinyl and a common component of carpet backing), chlorinated solvents, and sodium hypochlorite (bleach). Dioxin is a potent carcinogen that is highly persistent in the environment and bioaccumulates through the food chain.

About 4 billion pounds of carpet enter the solid waste stream in the United States every year, accounting for more than 1 percent by weight and about 2 percent by volume of all municipal solid waste (MSW). Furthermore, the bulky nature of carpet creates collection and handling problems for solid waste operations, and the variety of materials present in carpet makes it difficult to recycle. Some believe that the solution lies in manufacturing with recovered materials.

Lifecycle and Trade-off Issues

Significant impacts can occur throughout the life cycle of carpet, and these impacts vary with the types of materials used, the pattern of carpet use and replacement, and the options available for reuse, recycling, or disposal. An approach for evaluating the lifecycle impacts of carpet and other floor coverings is included in the Building for Environmental and Economic Sustainability (BEES) tool, which can be downloaded from www.epa.gov/oppt/epp/bees.htm. BEES includes lifecycle impact data on nylon and recycled polyethylene terephthalate (PET) carpet. General information on lifecycle analysis and its role in environmentally preferable purchasing can be found in the EPP General Training Tool at www.epa.gov/oppt/epp/gentt/.

What's Inside:

- All About Carpet
- Standards & Specifications
- Future Directions
- What Can You Do?
- Contacts and Resources

Produced by EPA's Environmentally Preferable Purchasing (EPP) Program, this is one in a series of purchasing guides aimed at helping procurement officials identify and purchase "greener" products and services. Check out all our EPP tools and resources at www.epa.gov/oppt/epp.



All About Carpet

Nylon is the most popular fiber used in commercial carpet facing. Two closely related forms of nylon, “nylon 6” and “nylon 6,6,” are used in carpet facing. Recycled nylon 6 is available and used by some manufacturers. At present, there are no commercial sources of recycled nylon 6,6. Some manufacturers believe that nylon 6,6 provides better performance for certain characteristics such as stain resistance. Polypropylene and polyester also are used in carpet face fiber. Recycled PET is widely available, but carpet made with PET face fiber is not as durable as nylon or polypropylene carpet and is usually recommended only for light- to moderate-wear conditions.

Carpet fibers may be “solution dyed” by the fiber manufacturer or dyed later at the carpet mill as the carpet is manufactured. Some believe that solution dyeing during fiber manufacture results in lower emissions and better color fastness than subsequent dyeing at the carpet mill. However, the differences between solution dyeing and mill dyeing are highly dependent on the particular processes used, and it is difficult to generalize about the advantages of one process versus the other.

Carpet backing is used to provide structural support to the face fiber. The primary materials used in carpet backing are jute, polypropylene, polyvinyl chloride (PVC), and polyurethane. Jute is a renewable bio-based product but is not as durable as the synthetic backings. Recycled-content (up to 100 percent) PVC backing is available, but dioxin and other chlorinated byproducts are formed during the manufacture and disposal (by incineration) of PVC. Polypropylene avoids the chlorinated byproduct issues of PVC, but its manufacture requires somewhat more energy than PVC does, and



recycled-content polypropylene backing is not readily available. A new polyurethane backing under development uses a polyol derived from soybean oil. In addition to the renewable resource advantage, it appears that soy-based polyurethane requires less energy during the curing step than polyurethane made from standard petroleum-based polyols.

Carpet cushion is placed underneath the carpet to provide additional comfort, insulation, and noise reduction. In some cases, the cushion is integrated with the backing. Materials commonly used in carpet cushion include polyurethane, jute, synthetic rubber, PVC, and other synthetic fibers. All of these substances can be obtained from recovered materials.

Because of its complex nature (typically at least three different materials bonded together), carpet is a difficult item to recycle. However, some manufacturers do have programs to collect used carpet for materials recovery and subsequent processing into a variety of products. Most of the carpet in the United States that is recycled is separated and processed into new products by the DuPont Carpet Reclamation Program (1-800-4DUPONT). A few other carpet manufacturers have collection programs for used carpet, and a number of manufacturers incorporate postconsumer materials in their carpet. A description of recycling activities in the carpet industry can be found at the Carpet and Rug Institute's Web site.

VOCs can be emitted from any or all carpet components, as well as from the adhesives that are sometimes used during carpet installation. Field or laboratory testing can help identify and quantify the compounds emitted. It is not possible to predict the identities and quantities of these emissions based solely on the chemical composition of the materials used in the carpet.



Standards and Specifications

A number of states and EPA Regions have incorporated contract language that takes health and environmental considerations into account when purchasing carpet. Massachusetts state agencies specify minimum levels of recycled content for carpet purchases; both Massachusetts and Minnesota allow only low-VOC adhesives; and Washington specifies the maximum emissions allowed in the first 30 days following installation. EPA Region 7 specifications prohibit certain chemicals and require emissions to meet the Carpet and Rug Institute's "Green Label" voluntary standard (see box, next page). Region 10 allows only low-VOC and formaldehyde-free adhesives and requires that any carpet unable to be reused must be recycled with the Dupont Carpet Reclamation Program or its equivalent.

The Carpet and Rug Institute's "Green Label" program encourages manufacturers to reduce chemical emissions from carpet products. EPA also is exploring the development of voluntary consensus standards for carpet products. The standards would incorporate environmental factors into the product design and manufacturing process. In addition, under EPA's Comprehensive Procurement Guidelines (CPG), federal agencies are required to purchase carpet and carpet cushion, among other items, with recovered content. The CPG currently addresses only polyester carpet, but recent proposed changes in the CPG also address nylon carpet and nylon carpet backing, as well as including some revisions to the existing polyester carpet designation (66 FR 45256, August 28, 2001).

Purchasers can find contract language and other voluntary standards for carpet in the EPP Database at www.epa.gov/oppt/epp/database.htm.

Future Directions

The Midwestern Workgroup on Carpet Recycling was a partnership of several states, the carpet industry, and EPA that addressed concerns about the large quantity of carpet that enters the solid waste stream. EPA's participation in the Midwestern Workgroup supported the Agency's Extended Product Responsibility program, which calls on those in the product life cycle—manufacturers, retailers, users, and disposers—to share responsibility for reducing the environmental impacts of their products. The Midwestern Workgroup concluded its meetings in January 2001 with the following outcomes:

- Government partners committed to developing model procurement guidelines that address EPP in the context of carpet purchases by public entities.
- Government and the carpet industry agreed to negotiate national outcomes for the end-of-life management of carpet, including the establishment of reuse and recycling rates.
- The carpet industry agreed to create, fund, and manage a third-party organization that will be responsible for achieving the negotiated outcomes.

The National Negotiated Outcomes Group on Carpet, at www.moea.state.mn.us/policy/carpet/, is a successor to the earlier Midwestern Workgroup and is developing a new Memorandum of Understanding that describes specific targets and timetables for the agreed-upon outcomes and sets the roles and responsibilities of the various signing parties, including the newly formed third-party organization named Carpet America Recovery Effort.

Five Guiding Principles

To help government purchasers incorporate environmental considerations into purchasing decisions, EPA developed five guiding principles. The guiding principles provide a framework purchasers can use to make environmentally preferable purchases. The five principles are:

1. Include environmental considerations as part of the normal purchasing process.
2. Emphasize pollution prevention early in the purchasing process.

3. Examine multiple environmental attributes throughout a product's or service's life cycle.
4. Compare relevant environmental impacts when selecting products and services.
5. Collect and base purchasing decisions on accurate and meaningful information about environmental performance.

For more information, go to the five guiding principles on EPA's EPP Web site at www.epa.gov/oppt/epp/fivegp.htm.

Carpet and Rug Institute's Green Label Emission Limits

The Carpet and Rug Institute recommends the following emission limits for carpet, cushion, and adhesive products.

Carpet

TVOC 0.500 mg/m²hr

Styrene 0.400 mg/m²hr

4-Phenylcyclohexene 0.050 mg/m²hr

Formaldehyde 0.050 mg/m²hr

Cushion

TVOC 0.500 mg/m²hr

Butylated hydroxytoluene (BHT) 0.400 mg/m²hr

4-PCH 0.050 mg/m²hr

Formaldehyde 0.050 mg/m²hr

Adhesive

TVOC 10.00 mg/m²hr

2-Ethylhexanol 3.00 mg/m²hr

Formaldehyde 0.030 mg/m²hr



What Can You Do?

Environmentally preferable carpet choices each have their own merits, and choosing one depends on the specific need, location, and use for the carpet. Some questions to consider in determining the best choice for your situation include:

What are the durability requirements?

Since increasing the durability of carpet generally requires a more resource-intensive manufacturing process and makes use of recycled material difficult, it is important to anticipate the expected use pattern and replacement schedule in order to make the best environmental purchase. For example, don't specify the most durable carpet for a temporary space with light use and frequent change in tenants and, therefore, frequent renovations and flooring replacement.

Tiles or broadloom?

Tiles use more material initially because of the need for a thicker backing but, depending on the use pattern, can save materials in the long run because worn or soiled tiles can be replaced individually rather than replacing the entire carpet. Also, keep in mind that broadloom carpet comes in standard widths — typically 6 and 12 feet. Because tiles are smaller, typically less carpet is wasted when tiles are installed in spaces with different dimensions.

What is the recycled content of the carpet face fiber, backing, and cushion?

Is there a mechanism for recycling some or all of the carpet components?

What are the chemical emissions from the manufacture and disposal of carpet materials?

What are the emissions from the carpet itself or from other materials used during its installation, e.g. adhesives? Do any of these emissions present indoor air quality concerns?

It's Policy

The federal government has undertaken various initiatives to mandate the consideration of the environment in purchasing decisions. A growing number of state and local governments also have implemented green purchasing policies or programs. In 1995, EPA established the Environmentally Preferable Purchasing (EPP) Program to encourage federal employees to consider a broad range of environmental factors, such as reduced toxicity and lower VOC content, in their purchasing decisions. In 1997, the Federal Acquisition Regulation (FAR), which provides broad purchasing guidance to federal employees, was amended to support federal procurement of green products and services. In addition, executive agencies, under Executive Order 13101, have been directed to identify and give preference to the purchase of products and services that pose fewer environmental burdens.

Contacts and Resources

Green Seal

www.greenseal.org

Green Seal is the independent, nonprofit organization dedicated to protecting the environment by promoting the manufacture and sale of environmentally responsible consumer products. It sets environmental standards and awards a Green Seal of Approval to products that cause less harm to the environment than other similar products. The *Choose Green Report on Carpets* offers a list of recommended carpet brands, their manufacturers, and contacts. Green Seal's consensus Environmental Standard for Commercial Adhesive, GS-36, covers carpet adhesives. Both the report and the standard are available through Green Seal's Web site.

Comprehensive Procurement Guidelines (CPG)

www.epa.gov/cpg

Designates products that can be made with recovered materials and recommends minimum recovered material content levels.

The National Negotiated Outcomes Group on Carpet

www.moea.state.mn.us/policy/carpet/

Partnership of several states, the carpet industry, and EPA; addressing concerns about the large quantity of carpet that enters the solid waste stream.

DuPont Carpet Reclamation Program (1-800-4DUPONT)

Collects and separates used carpet; processes into new products.

Carpet and Rug Institute

www.carpet-rug.com

General information on the carpet industry and information on the CRI Green Label program.

EPA's Purchasing Tool Suite

EPA's EPP Program has developed the following Web-based tools to help purchasers consider the environment, along with price and performance, when buying a product or service:

Database of Environmental Information for Products and Services — A searchable database of product-specific information (e.g., environmental standards and guidelines or contract language) developed by government programs, both domestic and international, as well as third parties.

www.epa.gov/oppt/epp/database.htm

Promising Practices Guide for Greener Contracts — A series of short case studies highlighting successful strategies for incorporating environmental factors into a variety of product and service contracts.

www.epa.gov/oppt/epp/ppg

General EPP Training Tool — Covers basic EPP principles and mandates, along with some more in-depth applications of EPP, in an entertaining and multimedia format.

www.epa.gov/oppt/epp/gentt/

Tips for Buying Green with the Government Credit Card — Tips to help government credit card holders make greener choices when buying products, such as cleaning products.

www.epa.gov/oppt/epp/creditcard.htm



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